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(54) A variable and adjustable delivery teat for an infant's feeding bottle

(57) The teat (1) is intended to be fitted on a feeding bottle for infants and has, at the end (5) of the nipple (3) intended to be subjected to the infant's sucking action, at least one slit (7) to pass the infant's food. In the zone situated around the slit or slits (7), the end wall (5) has an extra thickness, in particular in the form of at least one moulded bead (9a-b) formed at the outside and/or in the inside of the nipple (3). Each bead (9a-b) can be continuous or discontinuous. If discontinuous, it is constituted by two portions (9a and 9b) situated opposite and spaced from each end of the slit (7). Thus tearing of the teat (1) is prevented in the vicinity of the slit or slits (7), and the life of the teat is prolonged.

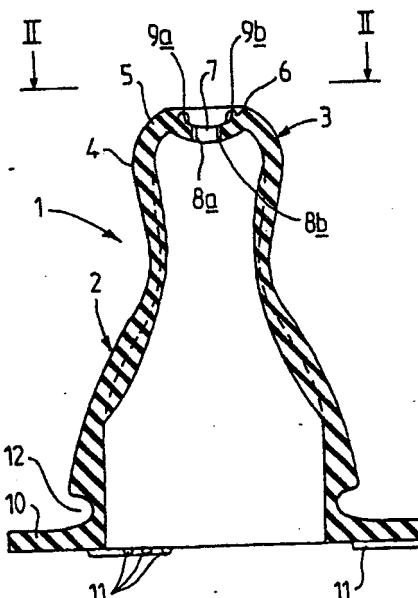
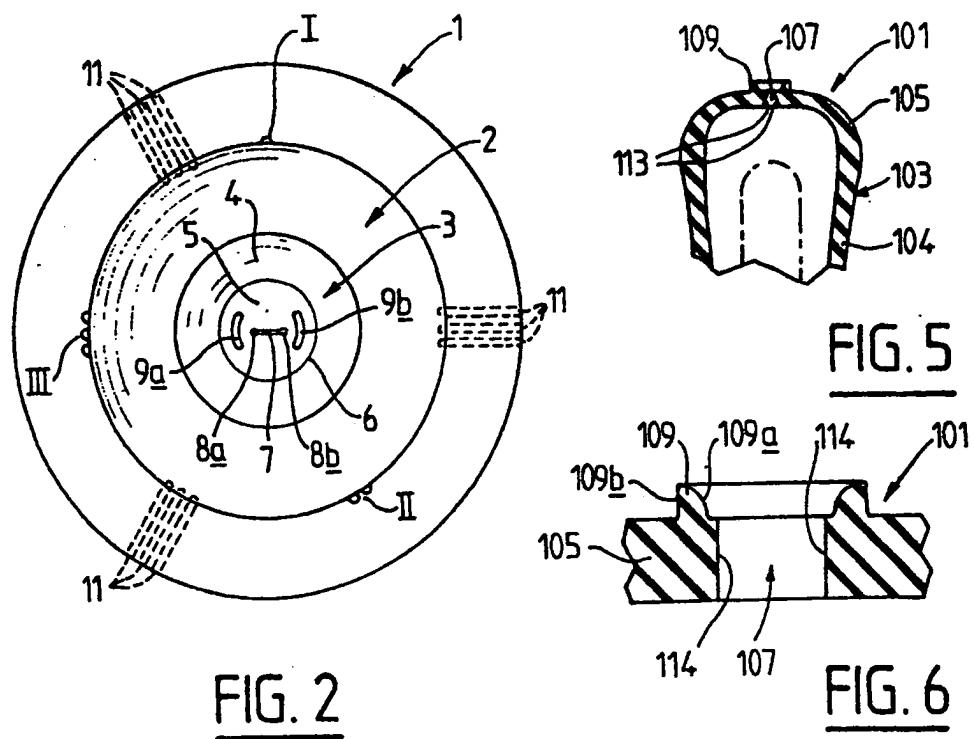
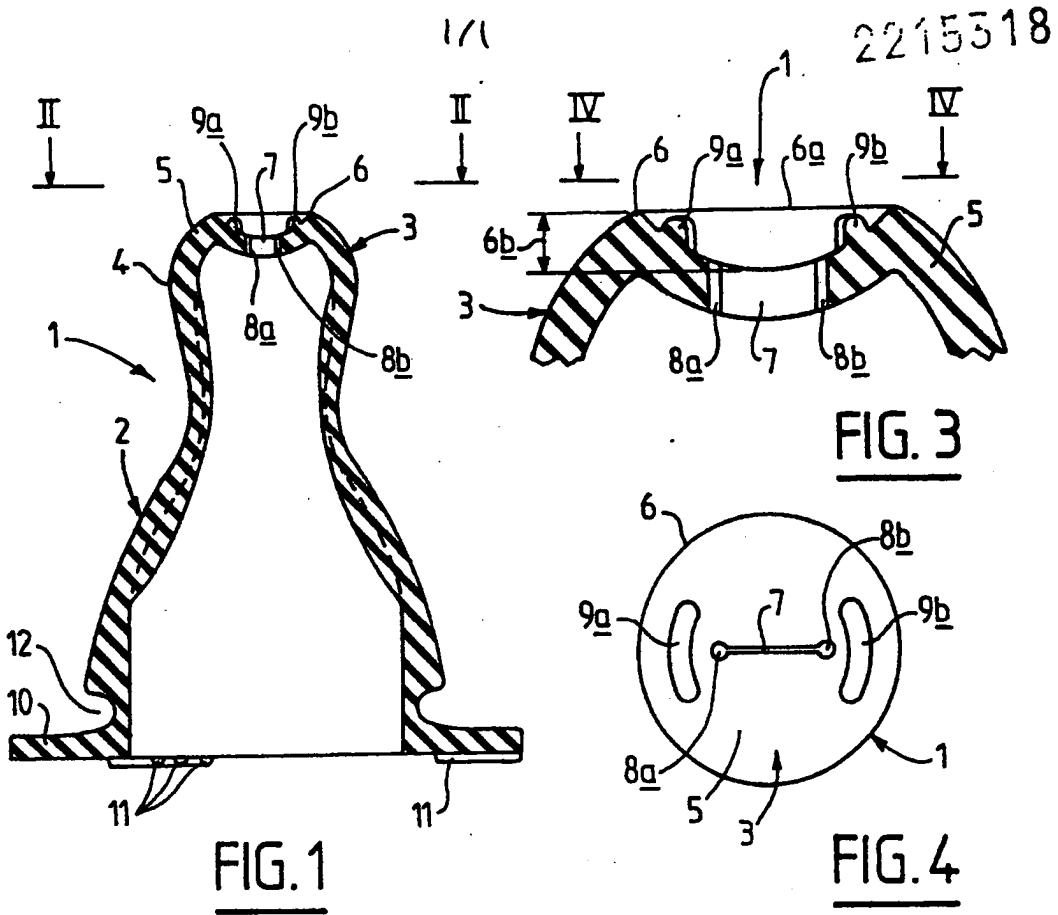


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy

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A VARIABLE AND ADJUSTABLE DELIVERY TEAT FOR AN INFANT'S  
FEEDING BOTTLE

The present invention relates to a teat with a variable and adjustable delivery intended to be fitted on a feeding bottle for the feeding of infants.

Such teats comprise, as a passage for the food such 5 as milk or pap contained in the feeding bottle, a narrow slit whose position is regulated in relation to the infant's lips by means of marks, generally three in number (I; II; and III), which are arranged either on the teat itself, or on its fixing collar or on the feeding bottle. The 10 adjustment of the position of the slit ensures a variation of the delivery by means of a larger, or smaller opening of the slit at each sucking movement of the infant's lips.

In the first adjustable delivery teats of this type, the slit was generally arranged on the rounded 15 protuberance forming the nipple of the teat, in other words it was cut on the convex substantially spherical end wall of the end of the teat.

To ensure that the feeding delivery should be substantially constant, at least in the minimum delivery 20 position, or subject to little variation depending on the sucking strength, it has been proposed in FR-A-2 417 978 to arrange the feeding slit on a concave curved surface disposed at the end of the teat, or also on a substantially flat surface. In the case where this surface is curved, the 25 slit is disposed at the bottom of the cavity.

It has also been proposed, in FR-A-2 052 206, that at least one of the ends of the slits should open at a hole pierced through the wall of the teat, which allows the slit to keep a constant length during the utilisation of the 30 teat. Moreover, when the sucking movements of the infant are no longer exerted on the teat, if the lips of the slit close again and if low pressure exists inside the teat, air can vent into the feeding bottle by passing through the end holes of each slit.

Finally, it has been proposed according to French patent No. 86-18345 that the slit should open towards the inside of the teat, the opposed longitudinal walls delimiting the said slit on the internal side of the teat 5 forming between them an angle which is not zero. In these conditions, when using the intermediate mark II, one obtains a delivery which really has an intermediate value between the two extreme values obtained when marks I and III respectively are used.

10 However, it has been noted in use that all of these teats with a variable and adjustable delivery had a tendency to tear, in particular at the ends of the slit, after a certain time of use.

We have now discovered that it is possible to 15 lengthen the life of these teats by a factor as great as four if, around the slit and at a certain distance therefrom, the end of the teat comprised an extra thickness which can only be formed in the regions adjoining the ends of the slit.

20 Accordingly the present invention provides a teat with a variable and adjustable delivery, for an infant's feeding bottle, said teat being made of a rubber or elastomeric material and having at that end of the nipple subjected to the infant's sucking action at least one slit 25 intended to pass the food dispensed by the teat, wherein in the region surround the or each slit the nipple has an extra thickness in its wall.

The extra thickness of the wall of the nipple may in particular take the form of at least one bead which is 30 obtained by moulding and is formed on the outside and/or the inside of the nipple. The or each bead is formed in particular on the outside of the nipple.

In a first embodiment, the teat comprises a single slit disposed in a radial plane of the teat or several slits 35 whose median line is parallel to said radial plane, the or each bead being discontinuous and limited to two sections

occupying two opposed zones having as their plane of symmetry the median line of the slit or slits.

In a second embodiment, the or each bead is continuous.

5 In one particular embodiment, the teat comprises a single bead, continuous or discontinuous.

Provision may be made for the or each slit to be arranged on a concave curved surface of the end of the nipple, the or each slit being disposed at the bottom of the 10 concavity; in this case, the continuous or discontinuous bead or beads will be disposed in the said concave curved surface. Advantageously, this concave curved surface is a spherical cap whose axis is identical with that of the teat, a continuous or discontinuous bead, being formed over a 15 circle whose centre is situated on this axis.

The or each slit may be arranged on a substantially flat surface of the end of the nipple; in this case, the or each continuous or discontinuous bead is disposed in said substantially flat surface.

20 According to the invention the single bead, or the bead nearest the slit or slits in the case of a plurality of slits, is situated at a distance of the order of 0 to 3 mm, and preferably 0.3 to 0.5 mm, from the adjoining slit; this distance is measured from the internal edge of the bead.

25 According to other characteristics of the present invention:

holes having a substantially circular cross section may be cut at the two ends of a slit;

30 at least one slit, formed when the teat is moulded, may open out towards the inside of the said teat, the opposed longitudinal walls delimiting the said slit on the internal side of the teat forming an angle between them which is not zero; and

35 the teat may be provided with three marks (I; II; III), orientated in relation to the slit or slits; the bead or beads may have a rounded external surface in a transverse

cross-section at least near the slit, may have a width measured at the bead base of the order of 0.1 to 2 mm and preferably of 0.5 mm, and may have a maximum height of the order of 0.1 to 2 mm and preferably 0.5 mm.

5 In order that the present invention may more readily be understood two embodiments, represented in the attached drawings, will be described below by way of purely illustrative and non-restrictive examples.

In these drawings:

10 Figure I is a cross-section of a first embodiment of teat according to the present invention, said cross-section passing through the longitudinal axis of the feeding slit comprised by the teat;

Figure 2 is a top view along line II-II of Figure 15 1;

Figure 3 represents on an enlarged scale, a cross-section of the end of the teat of Figure 1 wherein the feeding slit is arranged;

Figure 4 is a top view along line IV-IV of Figure 20 3;

Figure 5 is an axial cross-sectional view of the nipple of a second embodiment of teat according to the invention, said cross-section passing through the plane perpendicular to the plane passing through the longitudinal 25 axis of the feeding slit comprised by the teat, and through the axis of the teat; and

Figure 6 is an axial cross-sectional view, on an enlarged scale, of the end of the nipple of the teat of Figure 5, the said cross-section passing through the 30 longitudinal axis of the said slit.

Referring to Figures 1 to 4 of the attached drawings there will be seen a teat according to the invention, generally designated 1. This teat is directly obtained by the moulding, in particular of a silicone rubber 35 having a Shore A hardness of 30 to 70, for example a rubber marketed under the designation of "SILOPREN LSR 2035" by the

"BAYER" company.

The teat 1 is a conventional teat constituted by an ogive 2 surmounted by a nipple 3. The nipple 3 is subjected to the infant's sucking movements and comprises a substantially cylindrical portion 4 connected to the upper portion of the ogive 2, and an end portion 5 in the form of a substantially spherical dome or cap with its concavity turned towards the outside of the teat 1 and with its axis substantially identical with that of the teat 1. In this embodiment, the radius of the spherical cap is of the order of 1 to 7 mm, and preferably 4 mm, and the diameter of its circular lip 6 is of the order of 2 to 10 mm, and preferably 6 mm. If the spherical cap is intersected by a plane passing through its axis, the arc of the intersecting circle corresponds to an angle at the centre, of approximately  $90^{\circ}$ .

Also, the length of the chord 6a subtending the intersecting angle of the concave curved surface with an axial plane (see Figure 2) is at least twice the distance 6b measured between the centre of the chord 6a and the centre 20 of the above mentioned intersecting arc.

A rectilinear slit 7 is arranged within the concavity of the dome 5 extending in an axial plane of the teat 1. At each of the ends of the slit 7 is a circular hole 8a, 8b whose diameter is approximately 0.5 mm. The centres of the two ends holes 8a, 8b are approximately 3 mm apart.

Over a circle of approximately of 2.1 mm in radius, which is concentric with the circular lip 6, the wall of the dome 5 comprises, externally opposite each hole 8a 8b, a bead 9a, 9b respectively. Each bead extends over a circular arc of  $60^{\circ}$  centred on the longitudinal line of the slit 7; it has a height of the order of 0.5 mm and a width also of approximately 5 mm, the thickness of the teat 1 in the zone of the dome 5 being of the order of 0.6 to 2 mm and 35 preferably 1.2 mm. Moreover, the bead portions 9a, 9b have a rounded shape at each one of their ends (Figure 4) and

their profile is also rounded, substantially in the form of a semi-circle. (Figure 3).

At the end remote from the nipple 3, the teat 1 is folded outwardly to form a sole 10 which is intended to come 5 to be applied on the upper flange of the neck of the feeding bottle, the upper wall of the said sole 10 then being applied against the internal annular flange of a ring for connecting the feeding bottle to the teat; the body of this ring is intended to be screwed on to the threaded neck of 10 the feeding bottle.

The lower side of the sole 20 is provided with three groups of three moulded radial ribs 11 disposed at  $120^{\circ}$  with respect to each other, whose function is both to prevent the sole 10 from sliding in use on the upper flange 15 of the feeding bottle and to ensure air venting into the feeding bottle when its interior is at low pressure. On the external wall of the ogive shaped body 2, there is arranged, just above the sole 10, a peripheral groove 12 intended to receive the lower edge of the flange of the above mentioned 20 connector ring.

Moreover, three marks I, II, III are placed on the lower edge of the ogive of the teat 1; mark I is in axial plane perpendicular to the slit 7; mark II is located in an axial plane of the teat 1 forming an angle of  $45^{\circ}$  with the 25 plane containing the mark I; mark III is situated in the axial plane of the nipple 1 containing the longitudinal axis of the slit 7. The respective marks I, II and III are respectively constituted by I, II and III radial ribs moulded integrally with the teat 1.

As is known, when mark I is placed under the nose 30 of the infant who will use the teat 1, the sucking movement is effected without a large opening of the two lips of the slit 7 occurring, that is to say, one obtains the minimum delivery from the teat 1; when, on the contrary, the feeding 35 bottle is rotated around its axis to place the mark III under the infant's nose, the maximum delivery is obtained by

reason of the separation of the two lips of the slit 7; when mark II is used, the delivery for feeding the infant is intermediate between the deliveries obtained in the two previous cases.

5 It has been observed that the above described teat 1 has a life four times that of a teat which is identical save for the fact that it does not comprise bead portions 9a, 9b so its dome 5 had a tendency to tear rapidly from the ends of the slit 7.

10 Referring now to Figures 5 and 6, there will be seen a teat 101 in accordance with a variant. The teat 101 is essentially distinguished from the teat 1 by the shape of the nipple end, and by the shape of the slit and the bead which are arranged in this nipple end.

15 Thus, the nipple 103 comprises a flattened end portion 105, having a rectilinear slit 107 located in a radial plane of the teat 101. As may be seen, the slit 107 is delimited by two opposed longitudinal walls 113 (Figure 5) and by two opposed transverse walls 114 (Figure 6). The 20 two longitudinal walls 113 are arranged to slant so that they diverge from each other along a direction towards the inside of the teat 101. As for the transverse walls 114, they are flat walls perpendicular to the longitudinal plane of symmetry of the slit 107. The slit 107 is advantageously 25 formed during the moulding of the teat 101.

The end wall 105 comprises an external bead 109 (also obtained by moulding) which surrounds the slit 107 in a continuous manner and which is disposed at a distance of the order of 0 to 3 mm and preferably 0.3 to 0.5 mm from the 30 upper edge of the slit 107, this distance being measured between the said edge and the internal base of the bead 109. The bead has a width of the order of 0.1 to 2 mm and preferably 0.5 mm. It is delimited by an internal rounded wall 109a whose profile has the shape of a quadrant with a 35 concavity orientated towards the outside and by an external rectilinear wall 109b which is substantially perpendicular

to the end wall 105. The height of the wall 109b is of the order of 0.1 to 2 mm and preferably 0.5 mm, and the width of the bead 109 measured along the base of the latter is of the order of 0.1 to 2 mm and preferably 0.5 mm.

5 The presence of the bead 109 prevents the end wall 105 from being torn and ensures a much longer life for the teat 101.

It shall be duly understood that the embodiments described above are in no way restrictive and may give rise 10 to any desirable modifications without thereby departing from the scope of the invention as defined by the claims.

CLAIMS

1. A teat with a variable and adjustable delivery, for an infant's feeding bottle, said teat being made of a rubber or elastomeric material and having at that end of the nipple subjected to the infant's sucking action 5 at least one slit intended to pass the food dispensed by the teat wherein in the region surrounding the or each slit the nipple has an extra thickness in its wall.

2. A teat according to claim 1, wherein the or each said slit is rectilinear.

10 3. A teat according to claim 1 or 2, wherein the extra thickness of the wall of the nipple takes the form of at least one bead obtained by moulding and formed on the outside and/or the inside of the teat.

4. A teat according to claim 3, wherein the or 15 each bead is formed on the outside of the nipple.

5. A teat according to any one of claims 1 to 4, comprising a single slit disposed in a radial plane of the teat, or several slits whose median line is parallel to said radial plane, the or each bead being discontinuous and being 20 limited to two portions occupying two opposed zones having the median line of the or each slit as their plane of symmetry.

6. A teat according to any one of claims 1 to 4, wherein the or each bead is a continuous bead.

25 7. A teat according to any one of claims 1 to 5, comprising a single bead.

8. A teat according to claim 7, wherein the bead is discontinuous.

9. A teat according to any one of claims 1 to 8, 30 wherein the or each slit is arranged on a curved concave surface of the end of the nipple, the or each slit being disposed in the bottom of the concavity; and wherein said bead is disposed in the zone of said concave curved surface.

10. A teat according to claim 7, wherein the 35 concave curved surface is a spherical cap whose axis is

identical with that of the teat; and wherein a bead is formed over a circle whose centre is situated on this axis.

11. A teat according to any one of claims 1 to 8, wherein the or each slit is arranged on a substantially flat 5 surface of the end of the nipple; and wherein the or each bead is disposed in the vicinity of said substantially flat surface.

12. A teat according to any one of claims 1 to 11, wherein the single bead, or the bead nearest the at 10 least one slit in the case of a plurality of slits, is situated at a distance of the order of 0 to 3 mm from the adjoining slit, this distance being measured from the internal edge of the bead.

13. A teat according to claim 12, wherein the 15 distance is from 0.3 to 0.5 mm.

14. A teat according to any one of claims 1 to 13, including holes cut at the two ends of a slit, these holes having a substantially circular cross-section.

15. A teat according to any one of claims 1 to 20 14, including forming said at least one slit during the moulding of the teat, so the slit walls diverge towards the inside of the teat, the opposed longitudinal walls delimiting said slit on the internal side of the teat forming an angle between them which is not zero.

25 16. A teat according to any one of claims 1 to 15, wherein it is provided with three marks, orientated in relation to the or each slit.

17. A teat according to any one of claims 1 to 16, wherein the or each bead has a rounded external surface 30 in a transverse cross-section, at least near the slit; and has a width measured at its base of the order of 0.1 to 2 mm, and has a maximum height of the order of 0.1 to 2 mm.

18. A teat according to claim 17, wherein the bead has a width, and a maximum height, of 0.5 mm.

35 19. A teat for an infant's feeding bottle, substantially as hereinbefore described with reference to and as illustrated in; the accompanying drawings.